Geography and Innovation in Rock and Roll

A Senior Honors Thesis

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by
Lisa Dettling

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Project Advisor: Professor Bruce Weinberg, Department of Economics

I. Introduction

This paper will study the effect of geography on innovation in Rock and Roll Music. There has been recent interest in how geography effects innovation, specifically how the clustering of economic activity can create economies of scale, lower transaction costs, and allow for knowledge spillovers. This type of economic concentration can be seen in many geographical areas and across many industries. If the relationship exists in rock and roll music, we would expect to see a clustering in time and space of important musicians and musical works in specific genres or styles. This paper will test this idea quantitatively using data on critically acclaimed songs and information on the era and geographical origins of the musicians who produced them to determine the nature of innovation in Rock and Roll music.

The data employed examines the relationship between geography and important developments within genres, or styles of music. By examining the geographical distribution of important songs within a genre, we find that geography is important for the development of rock and roll music. From here, we will explain why geography is important for innovation. There are many explanations as to why geography may be important. I split these explanations into two categories called “structural effects” and “knowledge spillover effects,” and use the data to distinguish between the two effects. The “structural effects” are the factors related to the area itself, the combined effect of many firms and other actors in the production of music. The “knowledge spillover effects” are the factors related to the people in the area, like other musicians and record producers.

Determining which of these types of factors is the most important for innovation can be difficult. During the initial invention of the genre it is difficult to discern between the two types of influences, as both appear to present during the initial invention and perhaps linked to one another. However, by looking at later contributions to the development of a genre over time, we are able to test for the importance of each of the factors.

First, we can test for the importance of the knowledge spillover effects by looking at each genre's mobility over time. By constructing graphical descriptions of the regions for each genre over time, we can see if each genre tends to move from region to region over time. The idea here is that the knowledge spillover effects have the ability to be mobile and move to different regions over time, since it is just single persons. On the other hand, the structural effects cannot move to a different region over time, since they are the factors deep-rooted in the region itself. It is important to note that the knowledge spillover effects do not necessarily have to move. Thus, if a genre moves geographically over time, then this would indicate that the knowledge spillover effects are important for innovation. However, the converse of this statement is not necessarily true.

To test for the importance of the structural effects we can look at the difference between the areas we would expect to have a large structural effect and other areas. Here, we do this by looking at the major music centers relative to all other areas. The major music centers are the places historically considered to be very important in music production, like New York City, Los Angeles, London, and Nashville. In this test, we suppose that if the distribution of the major music centers is different than everywhere else, then structural effects are important.

After performing each of these tests, we find that the knowledge spillover effect has more explanatory power for this analysis. First of all, we find all of the genres are mobile, implying that the knowledge spillover effect is important. In addition, the important structural centers were found to be no more influential than the other areas, which means the structural effects are not important. Thus, we can conclude that the knowledge spillover effect drives innovation in Rock and Roll music.

The implications of this analysis could be quite profound for those involved in industries that rely on innovation. If these results can be applied broadly, then we have provided a new argument for why innovation tends to cluster in specific areas. In particular, our analysis contends that the actual area has little to do with promoting innovation. Instead, it is the knowledge spillovers gained from interaction that nurture innovation and create the beneficial environments we see in certain locations. Therefore, it may be more important that managers and policy makers cluster individuals together, regardless of the area, than to invest in specific locales.

II. Background

There is a growing literature in economics on the concept of innovation and its relation to geography. Weinberg (2006) finds that labor economists participating in the human capital revolution were primarily from the same geographic area, namely the University of Chicago. Jaffe, Trajtenberg, and Henderson (1993) use patent citations to show that knowledge spillovers are localized. Feldman and Florida (1994) provide evidence that innovation in the twentieth century is extremely dependent on the underlying infrastructure of an area, namely related firms, university and industrial

research, and development. Zucker, Darby, and Brewer (1998) find that the entry of firms in biotech industries is influenced by the geographic location of innovators in the field.

While this research has provided insight into innovation in academia and technological enterprise, it does not necessarily apply to innovation in more artistic fields. Innovation in areas like art and music are often considered the work of a few random creative geniuses instead of a network of innovators. However, there is some literature on innovation in these types of fields. Galenson and Weinberg (2001) look at the careers of 19th century European painters and find that the more conceptual art is, the younger the age is of important contribution. They have similar findings when studying American painters (2000). In a similar paper on Nobel Laureates, Galenson and Weinberg (2000) find the same relationship between age and conceptual innovation. From this work it would seem innovation in all fields may work in a similar way. However, this research only provides insight into the relationship between age and innovation; it does not shed light on the role of geography in innovation.

The idea that music is tied to geography is common among music critics and historians. Many speak of types of music using geographical labels, such as "Chicago Jazz" or "Southern Soul." While this idea has been studied by music theorists, to the best of my knowledge, no economist has analyzed these trends. The research by musicologist in this area has shown geography is important in the production of music. Street (1993) explains that while music is generally distributed on a national or international level, the local is important influencing the skills and tastes of musicians. In studying 16th century music, Bujic (1993) finds that the environment in which music is produced influences its

"musical language." Harrington (2002) explains that "Because the U.S. is such a large country, regional differences were a primary factor in determining the musical styles of bands…"

Musicologists and Rock historians also provide varying explanations for why geography influences musical style. Many historians emphasize aspects of the location itself when explaining why music develops in an area. John Street (1993) explains how local authorities can affect the type of music performed in a locality by setting restrictions, authorizing the construction of venues, and controlling the various local radio stations and record stores. Other historians emphasize the local culture as playing an important role. Harrington (2002) explains that the British nurtured progressive rock, "probably because of cultural factors," particularly, their historical ties to classical music, making this type of music "more inbred in their culture than [Americans']."

Alternatively, some historians emphasize the effect of people within an area, as opposed to the area itself as being the determining factor in the development of style in music. Harrington, (2002) in referencing the British Blues scene that spawned such notables as Eric Clapton and the Rolling Stones calls the scene in London " a small extended family: fellow travelers who swapped ideas and influences and sat in with each other's bands." In addition to fellow musicians, historians often speak of specific record producers recruiting musicians to an area that otherwise may not have had a lot of music. In speaking of the Muscle Shoals Recording Studio in Sheffield, Alabama, that created famous acts like Aretha Franklin, McNutt (2002)says, "[Muscle Shoals] had that notoriety, musicians form a 50-100 miles radius were willing to move [to Alabama] when

they weren't willing to move to Nashville[1]." Smokey Robinson, referencing the Motown record label claims "People were coming…to record their people in Detroit because they thought they were going to get the Motown sound. Like it was in the air somewhere." (The History of Rock 'n' Roll, 1995).

In addition to providing varying explanations for why geography is important, music historians have also discussed the idea that genres may move from place to place. In speaking of the Blues, Harrington (2002) claims, "many innovators of Rock'n' Roll were already perfecting their techniques in the '30s…There were all more or less peers, but it took their eventual migration to the big cities to draw attention to what they were doing (the root of which all went back to the [Mississippi] delta). In most cases, this meant Chicago…" In speaking of the various subgenres of Alternative rock, he first speaks of the influence of the Beatle's psychedelic experiments on rock, creating space rock in the British Blues scene, followed by the introduction of progressive rock and new wave. He goes on to discuss the Punk explosion in New York City and England in the '70s and the explosion of Grunge in the Pacific Northwest in the early '90s. While these are informative cases within specific genres, there has been no large scale quantitative study of the effect of geography on innovation in rock and roll and why this relationship occurs.

III. Data

For this paper, a dataset of important contributions to the development of Rock and Roll music was constructed. The data was collected for a sample of 500 songs chosen by prominent Rock critics, historians, and Rock and Roll Hall of Fame curators for the

[1] Nashville was a major recording center in the mid to late 20th Century

Rock and Roll Hall of Fame's opening in 1995, called "500 Songs that Shaped Rock and Roll." This dataset is ideal for examining innovation. Since the data focus on music that *shaped* rock and roll, it includes musicians who were the pioneer innovators and influenced others. Often, as in many creative pursuits, important innovators in music history were not extremely popular during their lifetime and this dataset includes these people as well as the best-selling artists.[2] Since the data is organized by songs and not artists, more important artists are listed more than once and therefore weighted more heavily. To construct the data, we collected biographical information on each musician from *The Rolling Stone Encyclopedia of Rock and Roll, The All Music Guide to Rock, The All Music Guide to Blues, The All Music Guide to Jazz,* and *The All Music Guide to Country*. For each musician we collected information on the year and location where the musician(s) recorded their first album, as well as the year and location where each musician was born. In addition, we collected three different classifications, or indicators of the genre each musician was classified in.

Next we aggregated the information collected on location and genre so as to have a uniform way to compare the musicians. For the genre category, we aggregated the genre information we had collected into eleven main genres based on classifications of genres included in the *All Music Guide to Rock* website, which aggregates many subgenres into main genre categories. These main genres are Hard Rock, Alternative Rock, Folk Rock, Pop/Soft Rock, Blues, Jazz/Swing, Country, Folk, R&B, Hip Hop, and World Music. For a detailed listing of the classifications of each genre see Appendix 1[3].

[2] In addition to the problem of general acceptance of new styles, in the early 20th century, there were often racial biases that prevented artists from being exposed to those outside their own race.
[3] We have only included a detailed classification for the genres which had more than 40 observations and were used in the analysis

To determine which genre a musician fell into we looked at the indicators we had collected on the musicians' genre. For most, it was clear which genre the musician fell in. For the musicians' that had indicators falling into several main genres, we based it on the first indicator listed. From here, we dropped the genres with less than 40 observations, to decrease noise in the analysis. The final six genres were: Hard Rock, Alternative Rock, Folk Rock, Pop/Soft Rock, Blues, and R&B. We used the U.S. Census Regions and Divisions of the United States to aggregate the geographical information for some of the analysis. This created four divisions of the United States: Northeast, Midwest, South, and West. . In addition, we added two more factors to account for non-American musicians: Europe and World-Other.

IV. Analysis

1. Is Geography Important?

To determine the importance of geography in innovation we look at the geographical distribution of each genre. In addition, we look at the distribution of all of the genres combined. According to historians, geography is important in music because the variation across diverse regions produces different sounds. Thus, we would expect that these distributions would be different in several ways. First of all, we would expect the distribution of each genre to be different from the distribution of all of the genres combined. In addition, we would also expect that each genre would be different from every other genre.

Figure 1(a)-(f) are the geographical distribution of each of the genres and figure 1(g) is the distribution of all of the genres combined. First, we would like to see if the

distribution of each genre is different from the combined distribution of all of the genres. We perform a chi-square test and find we can easily reject equality for all of the genres (Table 1). It is important to note that there may be some bias is this statistic as each genre is included the "All Genres" distribution. However, this bias would tend to lower our test statistic, and as our results are easily rejected, this does not effect the implications of our analysis. Thus, it is clear that the geographical distributions of the genres are not the same as the combined distribution.

In addition to the distributions being unequal to the total distribution, we would like to see if each of the genres is unlike the others. If geography is important for innovation, we would expect that each genre would have a different geographical distribution. Here, the data confirms this expectation. Each distribution looks different than the rest. For instance, Hard Rock is dominated mainly by the West and Europe, while Blues is dominated by the Midwest and South. First, we do a chi-square test for independence for all six genres and we can easily reject the hypothesis of equality as the $\chi 2$ statistic is 294.992, which is well above the critical value at 99.5% of 53.67. Next, we test between each pair of genres (Table 2). Here, we can reject equality for all but one set of distributions.[4] Clearly, the geographical distributions are not the same between genres.

This analysis indicates that each genre has varying and different geographic distribution. This allows us to infer that geography is important for innovation in Rock and Roll music. While somewhat expected based on historical records, this is important for our analysis. Since geography is important, we can now begin to investigate why this is the case.

[4] For Alternative Rock and Pop/Soft Rock we cannot reject equality. However, the two types of music are not extremely dissimilar from one another. For instance, Pink Floyd is included in Alternative Rock, and The Beatles are included in Pop/Soft Rock.

2. Why is Geography Important?

Historians and economists alike have offered a variety of explanations for why geography is important in innovation. Feldman and Florida (1994) and Street (1993) emphasize the importance of an area's infrastructure as an explanation for why innovation clusters geographically. On the other hand, Zucker, Darby, and Brewer (1998) and Jaffe, Trajtenberg, and Henderson (1993) argue for the importance of knowledge spillovers in the localization of innovation. Rock and Roll historians have cited various influences to a musician's style, such as other musicians, record producers, music stores, venues, the local culture, and social and political movements.

In order to sort out why geography is important for innovation, we need a way to systematically categorize the various influences on musical style and innovation. Here, we look separate the various influences based on whether or not they are an aggregate influence that reflects the area itself over a long period of time, or a more personal influence that may not have a connection to the area. We call the factors related to the area itself "structural effects," which includes deep-rooted aspects of the local culture and industry and infrastructure related to the production of music. We call the factors that are related to people "knowledge spillover effects," which includes other musicians, record producers, and short-lived social and political figures and movements. It is important to note that the knowledge spillover effects are able to change quickly over time, while the structural effects are relatively stable over the life span of the genre. Another important note is that by "industry" we are referring to the combined influence of *many* different record stores, radio stations, venues, production companies, and other firms that influence

the way music is produced. Thus, a single, small, record producer is considered to be a knowledge spillover because his primary influence is short-lived and he is considered relatively mobile.

Knowledge Spillover Effects

The first aspect of the data that will allow us to determine the causality of the relationship between geography and innovation is the distribution of each genre over time. Since the knowledge spillover effects have the ability to be mobile over time and the structural effects do not, by looking at the mobility of each genre over time can test for the importance of knowledge spillovers. Thus, if the genres are mobile over time, it would imply that knowledge spillovers are important. It should be noted that knowledge spillovers do not have to be mobile over time, so the converse of our hypothesis is not necessarily true.

To test for the mobility of genres over time, we need a way of quantifying mobility for each genre. For each region in each i^{th} genre we create a polynomial:

$$region_i = \beta_0 + \beta_1(year_i) + \beta_2(year_i)^2 + \beta_3(year_i)^3 + \beta_4(year_i)^4 + \varepsilon_i$$

By graphing these for each region over each genre's lifespan we are able to see the various peaks and troughs each region experiences. In addition, we plot the observations on the polynomials as data points to better see the amount of data creating the peaks. The graphical descriptions of each genre are shown in figures 2 (a)-(f). In addition, the coefficients and standard errors for each polynomial are included in Appendix 2.

From the graphical descriptions of the data, we see that each genre has a good deal of variation over time, with one region clearly dominating for periods of five to ten

years, followed by another. To quantify the mobility of each genre we can look at the number of different regions that experience dominance, or a peak, for a period of time. Thus, a genre that has several different regions with peaks is one that is mobile.

In order to do quantify the number of peaks, we need a systematic definition of a peak. We define three different types of peaks based on the number of years the region is above all others, the number of observations included in the peak, and the percentage of songs in the region. The first type of peak we call a primary peak and define as a period of at least 20% of the genres life span where the region experiences a point that is at least 40% above any other genre. In most cases 20% of the genres lifespan is approximately five years, although for Blues and R&B it is more like ten years. The second type of peak we call a populous peak and define as a primary peak which includes at least 20% of the observations in the genre. The third type of peak is called a secondary peak. These are the smaller variations in the data that happen below the primary peaks, but are still of importance in analyzing mobility. We define these as a period of time that a region is above 20% and is not a primary peak.

By these definitions every genre experiences three to four peaks, implying that the genres are mobile over time. Blues and Folk Rock both experience two populous peaks and one secondary peak. R&B experiences two populous peaks and two secondary peaks. Alternative Rock and Hard Rock both experience one populous peak, one primary (non-populous) peak, and two secondary peaks. Pop/Soft Rock has one populous peak and two secondary peaks. The location of each of these peaks is noted in Table 5. Thus, R&B, Alternative Rock, and Hard Rock are the most mobile, while Pop/Soft Rock is the least

mobile. However, since each of these genres experiences more than one peak, they are mobile and we can therefore infer that knowledge spillover effects are important.

Structural Effects

The analysis thus far has focused on testing for the importance of knowledge spillover effects. Next, we will test for the importance of the structural effects. If innovation is the product of structural effects, then areas that have a large amount of industry and infrastructure devoted to music production should have a larger structural effect than other areas. Historically, Los Angeles, London, Nashville, and New York City have been considered the major music centers, in that they are large cities with large entertainment industries and a lot of infrastructure devoted to the production of music.

We can test for the magnitude of the structural effects by comparing the distribution of the major music centers to the distribution of non-music centers using a chi-square test. If the distributions are different, than the structural effects may be important. For this test, we divide each genre into terciles by number of observations. Then, we collect the number of songs in each of the regions per tercile, separating the songs from Los Angeles, London, Nashville, and New York City from the rest in that region. Next we aggregate all of the genres and perform a chi-square test of equality for the distribution of the music centers and the rest. If the structural effect is present, the time distribution of the areas could be different for several different reasons. It is possible that the major music centers are more important for the beginning, middle, or end of a genre's development. This could also be different between genres. No matter what the case may be, if structural effects are present the distribution of the music centers will be

somehow different than the distribution of the other areas. However, there is a possibility that these effects could offset one another and a failure to find a difference could be the result of this problem.

The results of the chi-square test for the distribution of the major music centers and non-music centers are included in Table 4. We also provide an analysis without Nashville in Table 5 because Nashville is often thought to be a Country Music center, instead of a Rock and Roll music center[5]. In either case, it is clear we cannot reject the null hypothesis of equality. For all four cities, there is only a 52% chance that the distributions are not equal, hardly enough to reject our hypothesis. Without Nashville, there is a 36% chance. Thus, we do not find evidence for the importance of structural effects.

V. Conclusion

We study the effect of geography on innovation in Rock and Roll music. We find that most genres of music have different geographical distributions that are not the same as the collective distribution or the other genres' distributions, indicating that geography is important for innovation in rock and roll music.

We try to decipher the reason that geography is important in rock and roll music by dividing the influences to innovation into two main categories: knowledge spillover effects and structural effects, where there difference between them is whether they are related to people or the area itself.

[5] Historically Nashville was always a major music center, however, since our sample omits country music, it is possible that Nashville's importance may be small and could skew the analysis.

We test for the importance of the knowledge spillover effects by studying the geographical distribution of the genres over time. We find that the majority of the genres are mobile, with each having three or more peaks over time. These results indicate that knowledge spillovers are important for innovation.

Next, we look for the importance of the structural effects by studying the difference between the major music centers and the rest of the areas sampled. We find there is no difference between the two, indicating that the structural effect may not be important for innovation.

Our results indicate that the relationship between geography and innovation in rock and roll music is important and primarily influenced by knowledge spillovers. Thus, we come to the conclusion that perhaps MoTown didn't have to have come from Detroit and the Blues didn't need to come from the South, but all of the artists involved merely needed to be in the same place at the same time, regardless of the location itself.

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Appendix 1: Genre Classifications

Alternative Rock

* Industrial
* Alternative Pop/Rock
* Goth Rock
* Lo-Fi
* Grunge
* Shoegaze
* Britpop
* Post-Rock/Experimental
* Funk Metal
* Indie Rock
* Paisley Underground
* Jangle Pop
* Alternative Country-Rock
* Punk Revival
* Post-Grunge
* Third Wave Ska Revival
* Neo-Psychedelia
* Riot Grrrl
* Space Rock
* Adult Alternative Pop/Rock
* Alternative Dance
* Cocktail
* Dream Pop
* Punk-Pop
* British Trad Rock
* Industrial Dance
* Madchester
* Psychobilly
* Ska-Punk
* Cowpunk
* New Zealand Rock
* Chamber Pop
* Twee Pop
* Emo
* Slowcore
* Electro-Industrial
* Ambient Pop
* C-86
* Indie Pop
* Noise Pop
* Math Rock
* Queercore
* Sadcore
* Shibuya-Kei
* Skatepunk
* Garage Punk
* Alternative Folk
* Neo-Glam
* College Rock
* Pop Underground
* American Underground
* Indie Electronic
* Punk Blues
* Screamo
* Alternative Singer/Songwriter
* Prog-Rock/Art Rock
* Kraut Rock
* Noise-Rock
* Neo-Prog
* Experimental Rock
* Canterbury Scene
* Avant-Prog
* Synth Pop
* Punk
* Alternative Pop/Rock
* Hardcore Punk
* New Wave
* Power Pop
* Ska Revival
* Mod Revival
* Post-Punk
* New Romantic
* No Wave
* Proto-Punk
* Oi!
* Garage Rock Revival
* British Punk
* Christian Punk
* New York Punk
* L.A. Punk
* American Punk
* Straight-Edge
* Anarchist Punk
* Sophisti-Pop
* College Rock
* Post-Hardcore

Blues

* Chicago Blues
* Modern Electric Chicago Blues
* Acoustic Blues
* Modern Acoustic Blues
* Classic Female Blues
* Acoustic Memphis Blues
* Acoustic Chicago Blues
* Acoustic New Orleans Blues
* Acoustic Texas Blues
* Blues Gospel
* Acoustic Louisiana Blues
* Country Blues
* Vaudeville Blues
* Prewar Country Blues
* Delta Blues
* Folk-Blues
* Early American Blues
* Memphis Blues
* Blues Revival
* Dirty Blues
* Work Songs
* Prewar Blues
* Spirituals
* Prewar Gospel Blues
* Songster
* Finger-Picked Guitar
* Jump Blues
* Piedmont Blues
* East Coast Blues
* New York Blues
* Electric Harmonica Blues
* Harmonica Blues
* Louisiana Blues
* Modern Electric Blues
* Modern Electric Chicago Blues
* Modern Delta Blues
* Contemporary Blues
* Modern Electric Texas Blues
* Electric Texas Blues
* Texas Blues
* Electric Chicago Blues
* Electric Blues
* Electric Texas Blues
* Electric Country Blues
* Electric Delta Blues
* Electric Memphis Blues
* Electric Harmonica Blues
* Urban Blues
* New Orleans Blues
* Swamp Blues
* Juke Joint Blues
* Detroit Blues
* Slide Guitar Blues
* Piano Blues
* West Coast Blues
* Jazz Blues
* St. Louis Blues
* Piedmont Blues

Folk Rock

* Country-Rock
* Folk-Pop
* Singer/Songwriter
* Folk-Rock
* British Folk-Rock
* Rock & Roll
* Blues-Rock
* Tex-Mex
* Instrumental Rock
* Rockabilly
* Roots Rock
* Surf
* Pub Rock
* Hot Rod
* Rockabilly Revival
* Surf Revival
* Swamp Pop
* American Trad Rock
* Jam Bands
* Heartland Rock
* Frat Rock
* Hot Rod Revival
* Retro-Rock
* Latin Rock
* Bar Band

Hard Rock

* Blues-Rock
* Christian Metal
* Hard Rock
* Southern Rock
* Thrash
* Death Metal/Black Metal
* Glam Rock
* Grindcore
* Heavy Metal
* Speed Metal
* Hair Metal
* Arena Rock
* Alternative Metal
* British Metal
* Boogie Rock
* Industrial Metal
* Rap-Metal
* Guitar Virtuoso
* Progressive Metal
* Neo-Classical Metal
* Album Rock
* Aussie Rock
* Pop-Metal
* Rap-Rock
* New Wave of British Heavy Metal
* Detroit Rock
* Glitter
* Punk Metal
* Stoner Metal
* Scandinavian Metal
* Goth Metal
* Doom Metal
* Symphonic Black Metal
* Sludge Metal
* Power Metal
* Psychedelic
* Garage Rock
* Acid Rock
* Psychedelic Pop
* British Psychedelia
* Obscuro
* Acid Folk

Pop/Soft Rock

* Christian Rock
* Pop
* Pop/Rock
* Girl Group
* Bubblegum
* Teen Idol
* Brill Building Pop
* Comedy Rock
* Baroque Pop
* Sunshine Pop
* AM Pop
* Celebrity
* Singer/Songwriter
* Adult Contemporary
* Soft Rock
* Pop/Rock
* Euro-Pop
* Euro-Rock
* Swedish Pop/Rock

R&B

* Soul
* Funk
* Disco
* R&B
* Urban
* Urban
* Latin Soul
* Doo Wop
* Motown
* New Orleans R&B
* Philly Soul
* Blue-Eyed Soul
* Go-Go
* Beach
* Country-Soul
* Freestyle
* Northern Soul
* Pop-Soul
* Retro-Soul
* Uptown Soul
* Southern Soul
* Deep Soul
* Memphis Soul
* Chicago Soul
* Smooth Soul
* Blaxploitation
* Brown-Eyed Soul
* Neo-Soul
* Psychedelic Soul
* Deep Funk
* Deep Funk Revival
* Post-Disco

Note: These Genre classifications can be found online at www.allmusic.com

Appendix 2: Coefficients and Standard Errors for Polynomials

	Alternative Rock		**Blues**		**Folk Rock**	
West	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
c	-8.01861	7.986349	0.233601	0.069748	2.549667	2.106361
year	131.8192	121.8111	-1.54073	0.935195	-93.9612	75.91706
year^2	-777.764	672.9856	-19.6121	9.950008	1260.02	965.711
year^3	1934.35	1601.945	8.451925	14.11741	-6652.42	5152.719
year^4	-1684.77	1387.62	179.54	113.9578	12341.15	9789.467
East						
c	-4.51841	14.8036	0.030423	0.043361	3.841186	1.72357
year	47.47788	225.7907	-0.86743	0.581393	-144.942	62.12059
year^2	-115.092	1247.455	0.947612	6.185728	1882.784	790.2116
year^3	-55.6881	2969.388	14.32795	8.776522	-9677.24	4216.311
year^4	288.9775	2572.112	-29.8071	70.84536	17044.37	8010.419
Midwest						
c	-11.0109	10.77247	0.544156	0.098604	-1.16529	1.017027
year	170.3074	164.3062	2.269306	1.322101	46.05419	36.65551
year^2	-940.893	907.7639	0.432053	14.06648	-584.678	466.2803
year^3	2232.207	2160.802	-15.3064	19.95801	3035.873	2487.92
year^4	-1924.88	1871.707	-66.9983	161.104	-5567.29	4726.71
South						
c	1.50759	8.286162	0.191821	0.091617	-4.1162	1.559069
year	-15.2336	126.384	0.138848	1.228416	186.6159	56.19167
year^2	30.70984	698.2499	18.23241	13.06973	-2441.93	714.7921
year^3	70.99151	1662.083	-7.47346	18.54378	12451.91	3813.898
year^4	-185.503	1439.712	-82.7345	149.6881	-21851.9	7245.888
Europe						
c	20.68201	17.20659	0	0	-0.10936	0.722544
year	-295.51	262.442	0	0	6.232789	26.04179
year^2	1573.862	1449.947	0	0	-116.201	331.2673
year^3	-3611.18	3451.392	0	0	841.8732	1767.534
year^4	2998.311	2989.628	0	0	-1966.34	3358.076
World						
c	2.358298	5.047002	0	0	0	0
year	-38.8605	76.97896	0	0	0	0
year^2	229.1773	425.2956	0	0	0	0
year^3	-570.682	1012.355	0	0	0	0
year^4	507.8631	876.9116	0	0	0	0

	Hard Rock		**Pop/Soft Rock**		**R&B**	
West	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
c	-17.0471	6.393587	-0.1757	2.307197	0.204844	0.055074
year	304.0371	110.1979	1.013046	53.63047	-2.10057	1.041449
year^2	-1906.37	681.7134	14.12937	444.8161	-5.83696	5.582299
year^3	5047.578	1788.412	-49.5983	1556.898	148.9486	70.16573
year^4	-4732.14	1678.612	3.436087	1943.227	-396.114	211.2131
East						
c	4.148814	3.933368	6.03912	3.240175	0.329391	0.074638
year	-80.6127	67.79431	-128.87	75.31743	-0.87937	1.411417
year^2	548.5664	419.3936	1041.146	624.6898	-18.4993	7.565371
year^3	-1518.76	1100.24	-3596.53	2186.472	103.5371	95.09161
year^4	1460.118	1032.691	4481.197	2729.025	-78.8447	286.2451
Midwest						
c	-2.45933	2.736596	0.323375	1.498321	0.0803	0.088678
year	42.36746	47.16712	-8.22097	34.82826	7.30235	1.676908
year^2	-253.696	291.7883	82.08972	288.8688	11.27824	8.988433
year^3	635.1563	765.4796	-325.251	1011.068	-384.201	112.9785
year^4	-566.696	718.4829	434.2131	1261.955	990.3198	340.0884
South						
c	0.017188	3.469636	0.015598	1.702144	0.387159	0.079309
year	-6.04811	59.80157	-4.77599	39.56611	-4.15484	1.499748
year^2	75.82459	369.9484	77.12163	328.165	11.5551	8.038834
year^3	-281.209	970.5254	-357.146	1148.608	117.145	101.0427
year^4	320.6601	910.9398	506.5398	1433.624	-450.202	304.1592
Europe						
c	8.956965	6.596254	-5.2024	3.535276	0	0
year	-128.78	113.691	140.854	82.17701	0	0
year^2	718.8167	703.3227	-1214.49	681.5837	0	0
year^3	-1774.95	1845.102	4328.521	2385.607	0	0
year^4	1601.095	1731.822	-5425.39	2977.572	0	0
World						
c	7.383429	2.43257	0	0	-0.0017	0.017579
year	-130.964	41.92703	0	0	-0.16757	0.332413
year^2	816.8615	259.3717	0	0	1.502917	1.781774
year^3	-2107.82	680.4377	0	0	14.57076	22.3957
year^4	1916.964	638.6621	0	0	-65.1589	67.41561

Figure 1a: Alternative Rock: Geographical Distribution

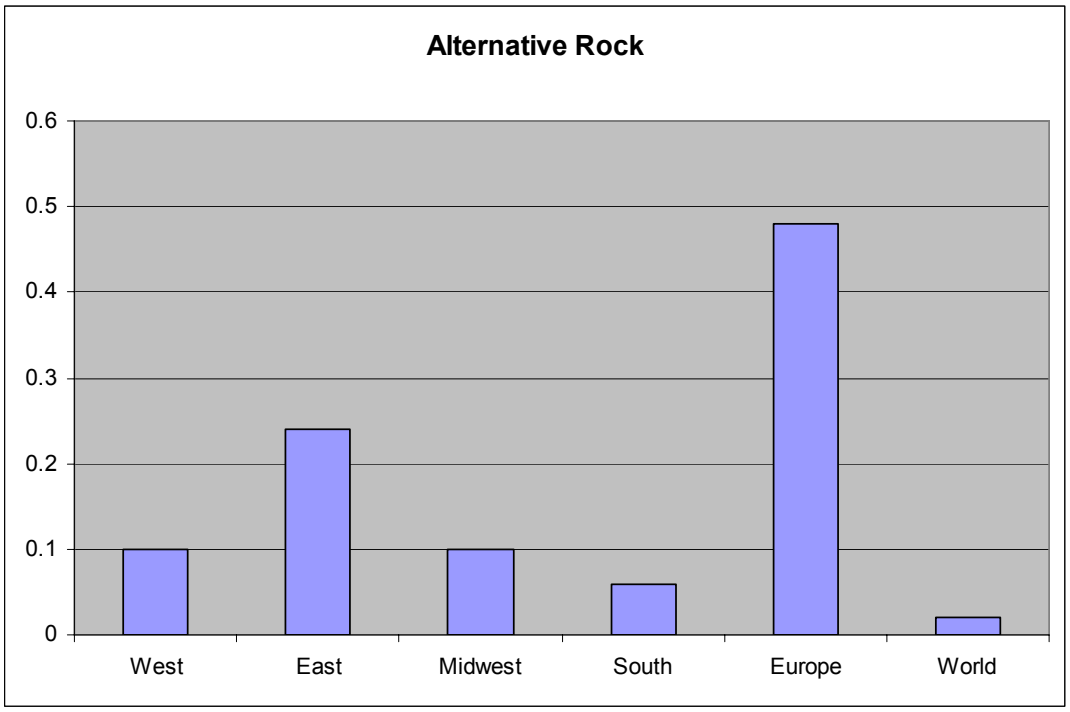

Figure 1b: Blues: Geographical Distribution

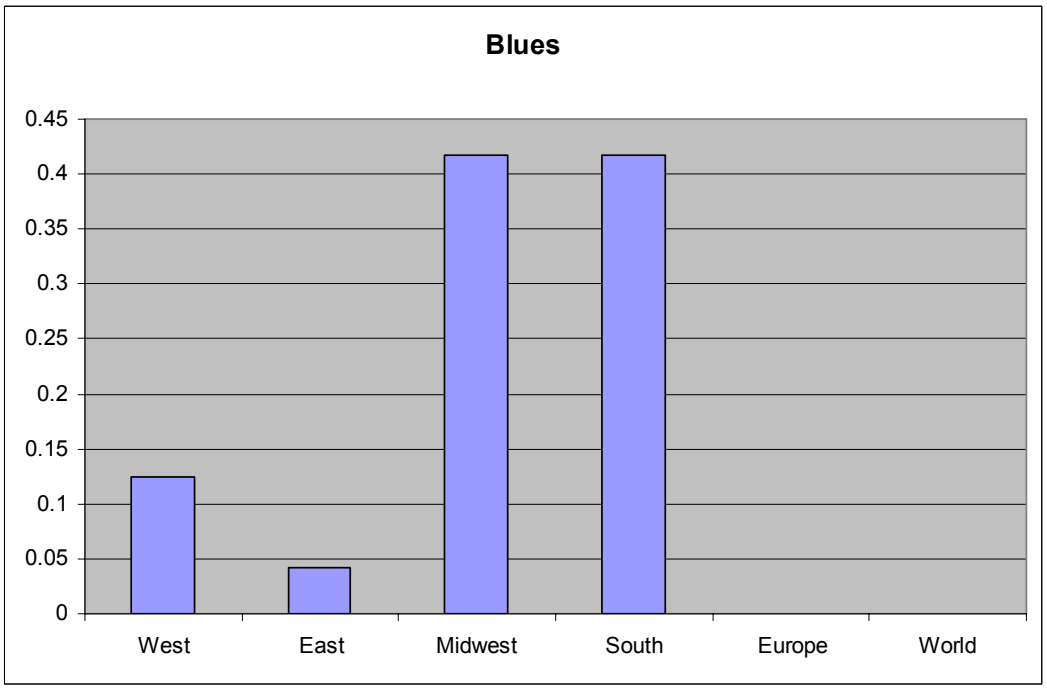

Figure 1c: Folk Rock: Geographical Distribution

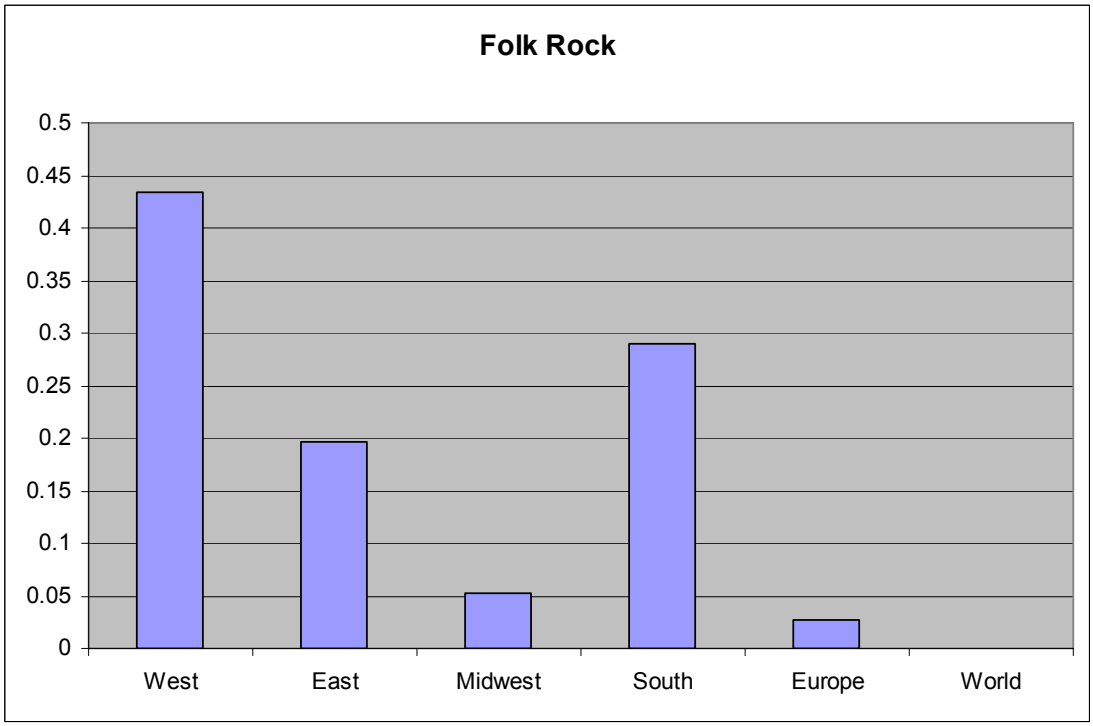

Figure 1d: Hard Rock: Graphical Distribution

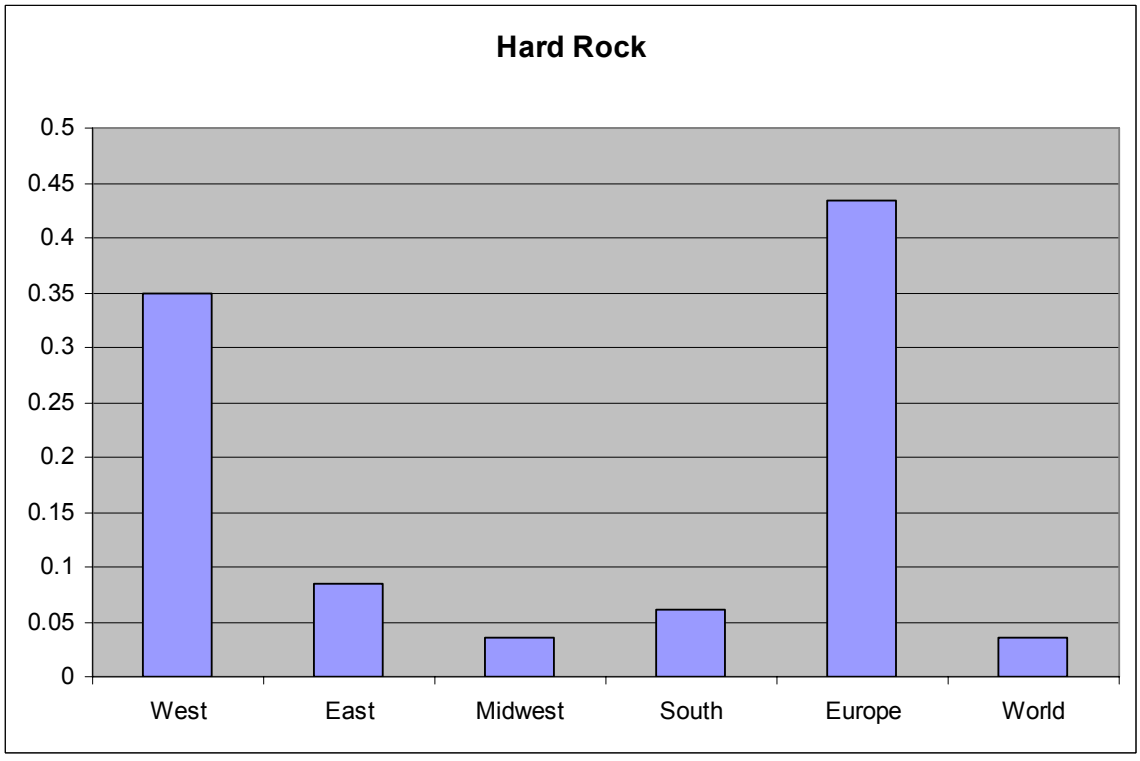

Figure 1e: Geographical Distribution of Pop/Soft Rock

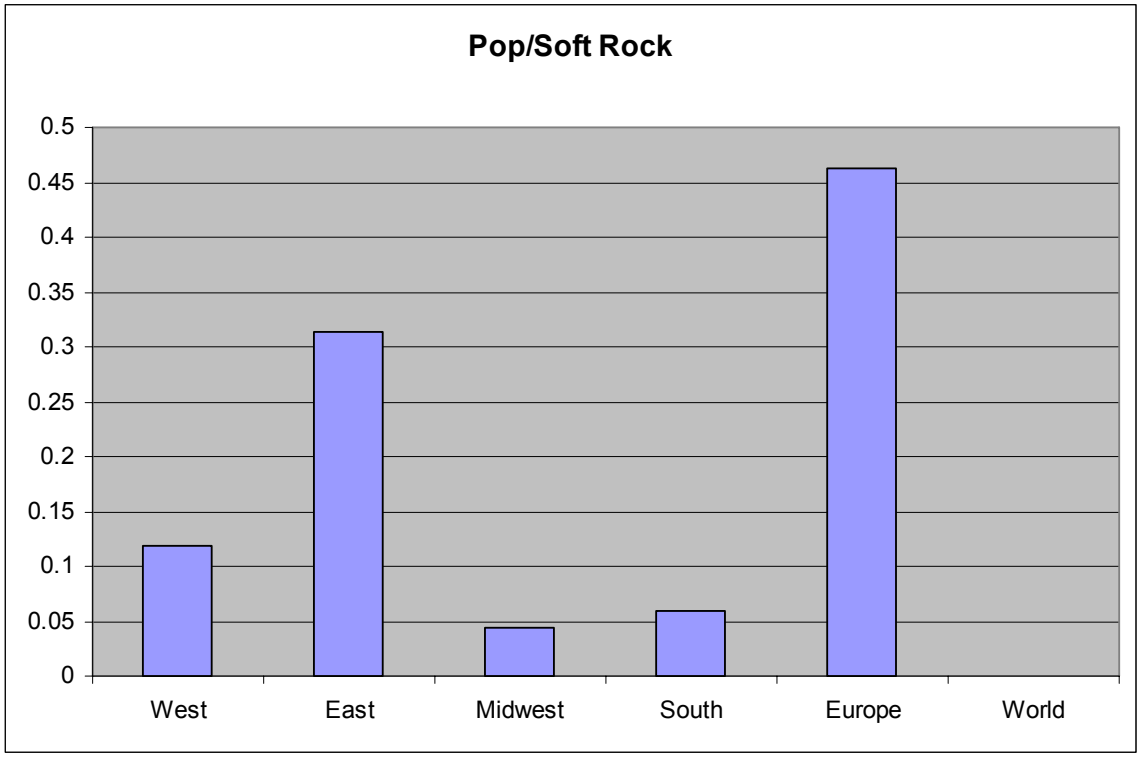

Figure 1f: Geographical Distribution of R&B

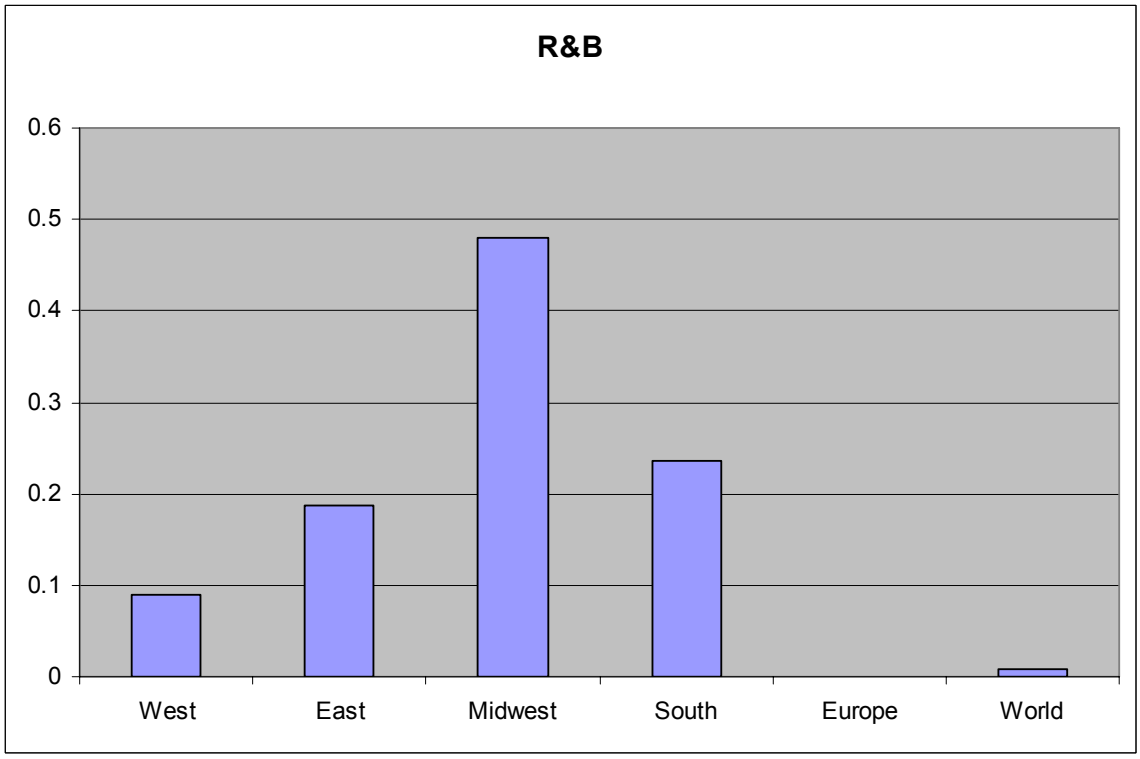

Figure 1g: Geographical Distribution of All Genres

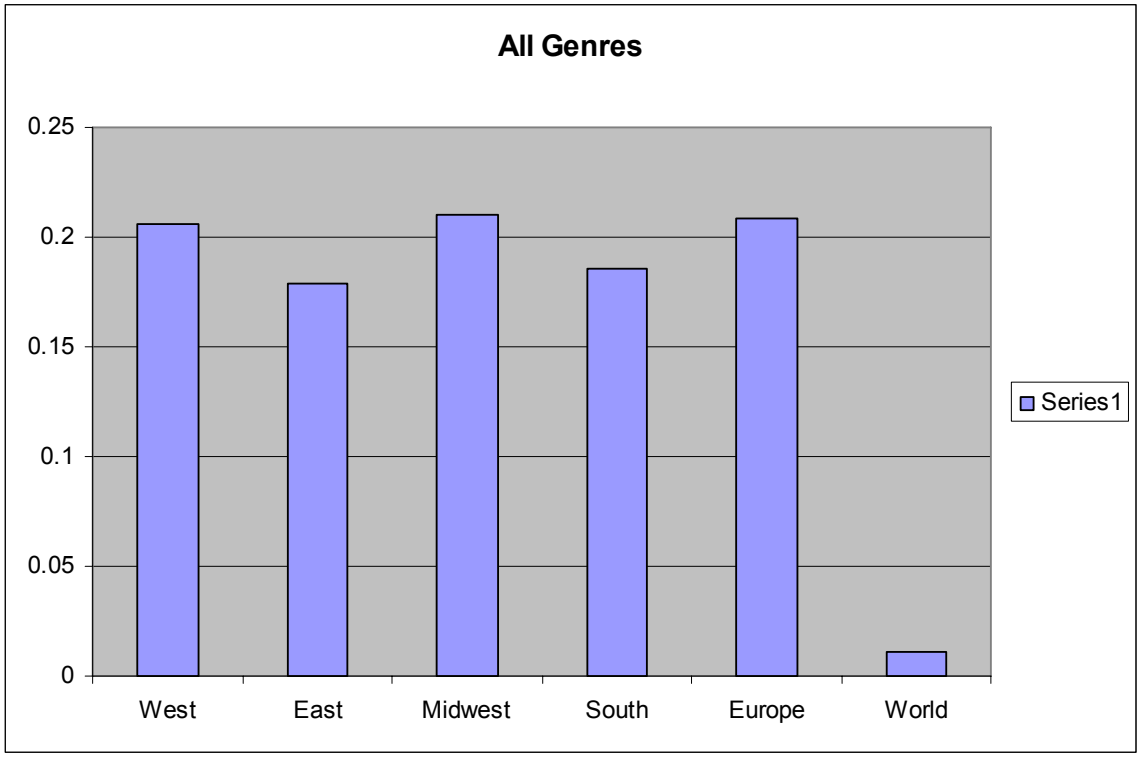

Figure 2a: Distribution of Regions for Alternative Rock over Time

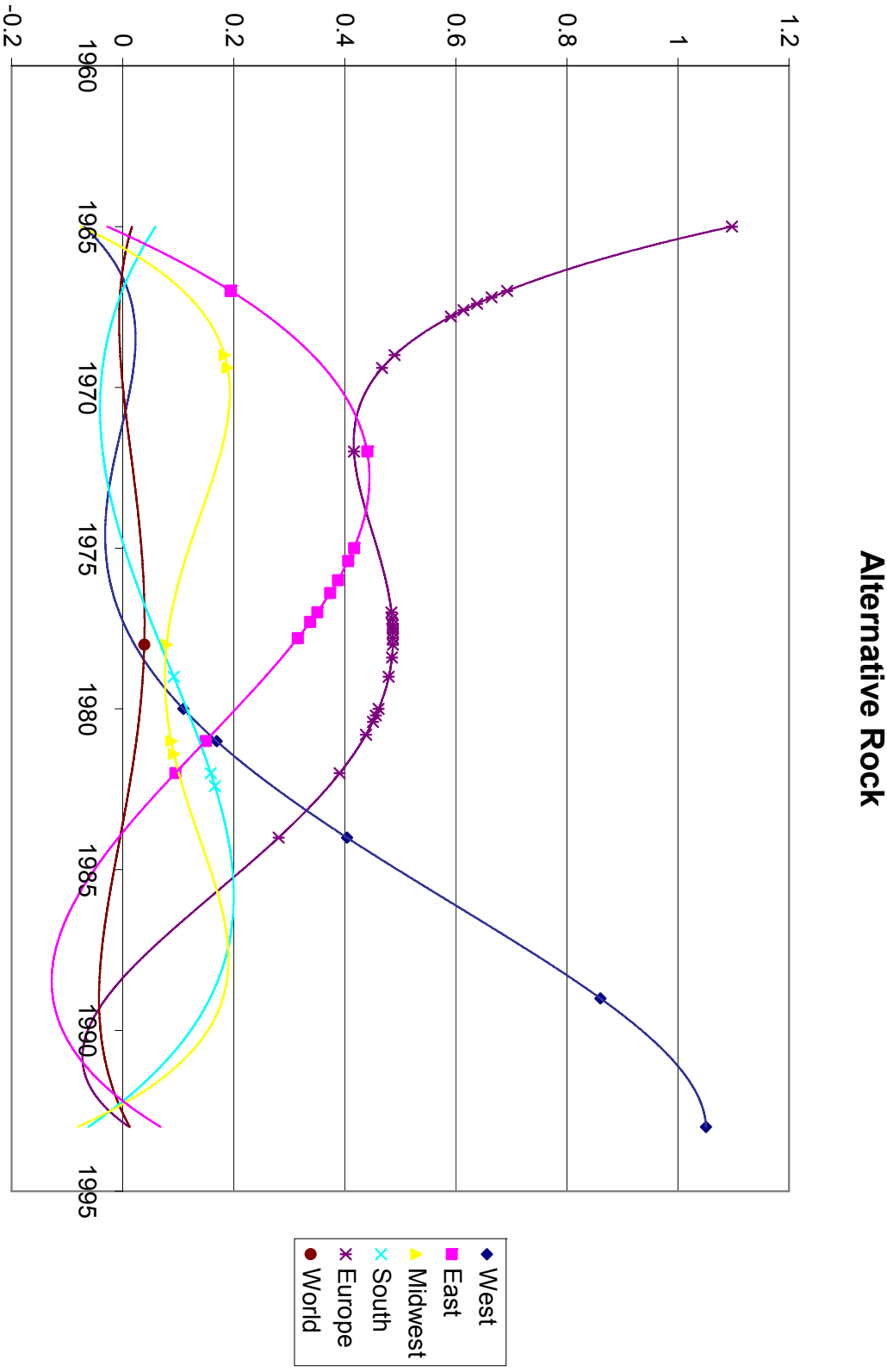

Figure 2b: Distribution of Regions for Blues over Time

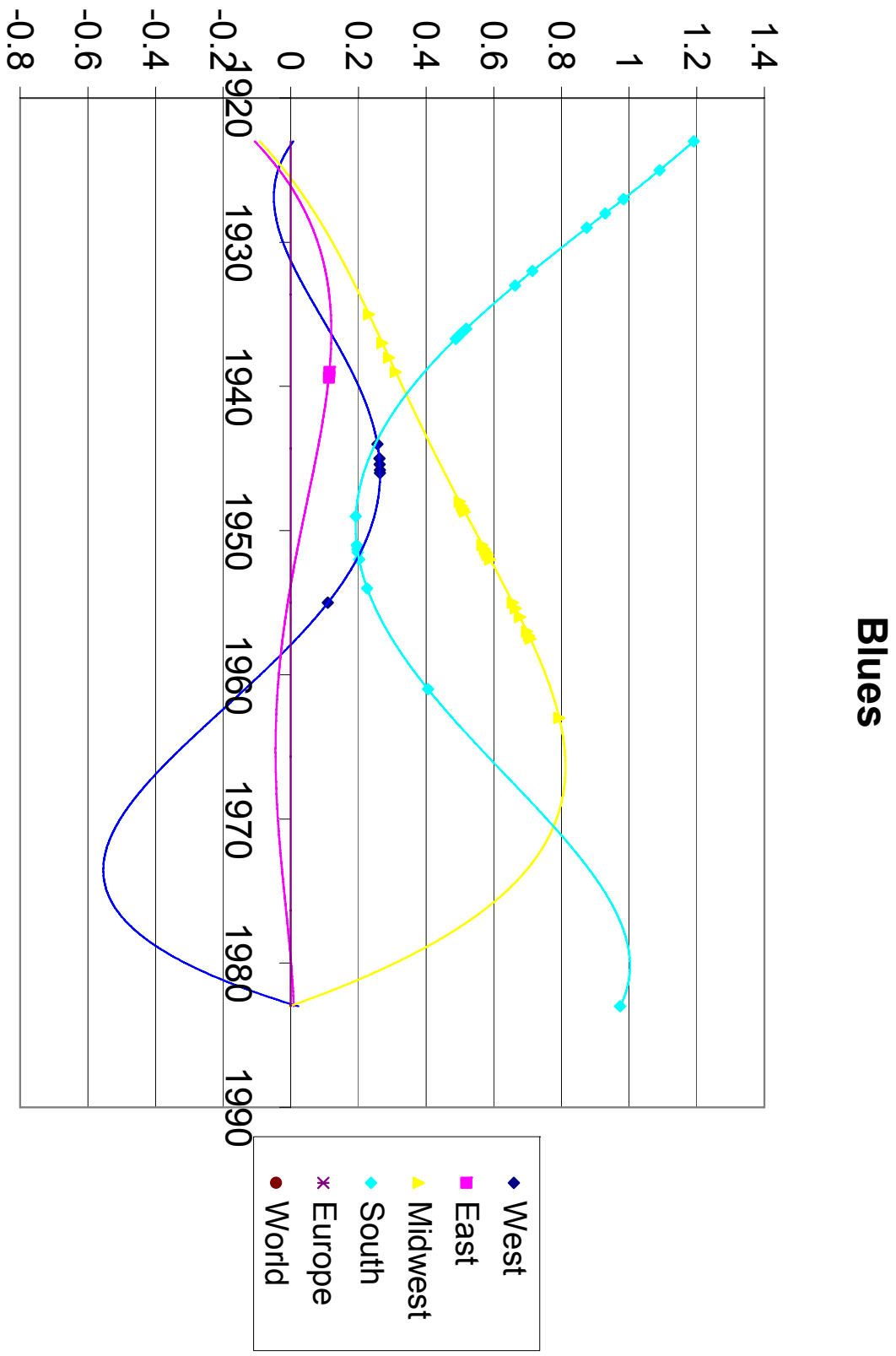

Figure 2c: Distribution of Regions for Folk Rock over Time

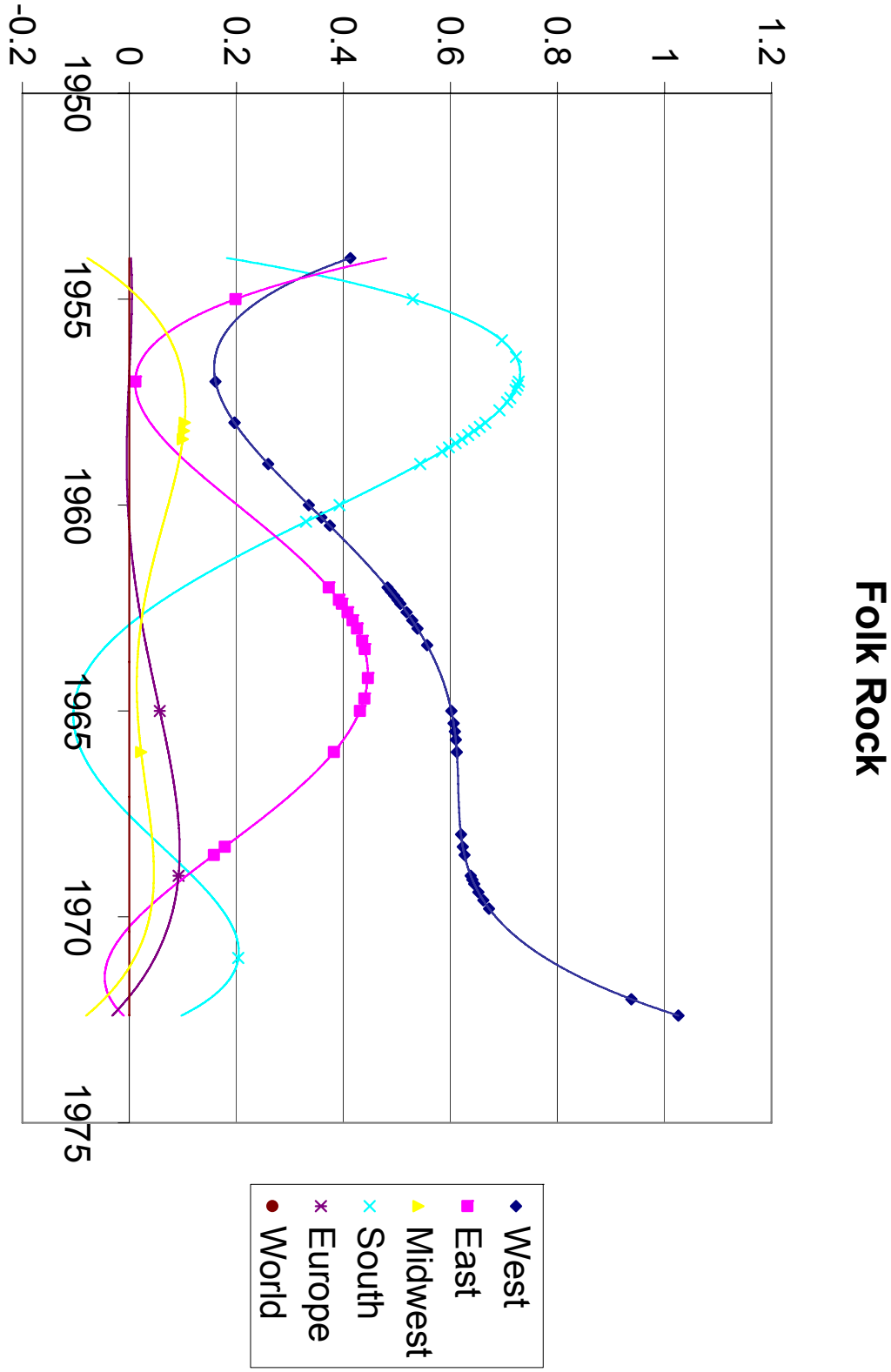

Figure 2d: Distribution of Regions for Hard Rock over Time

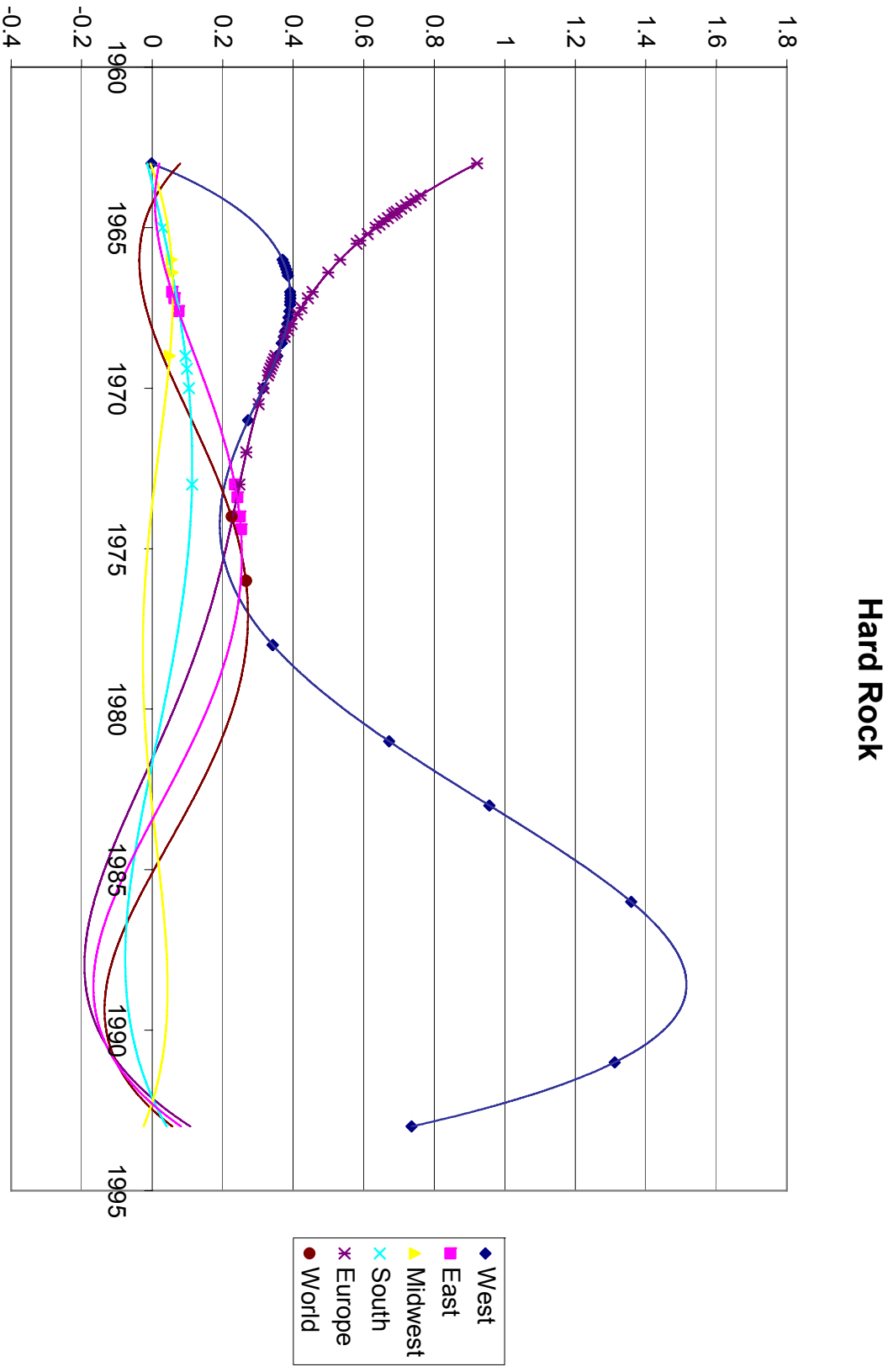

Figure 2e: Distribution of Regions for Pop/Soft Rock over Time

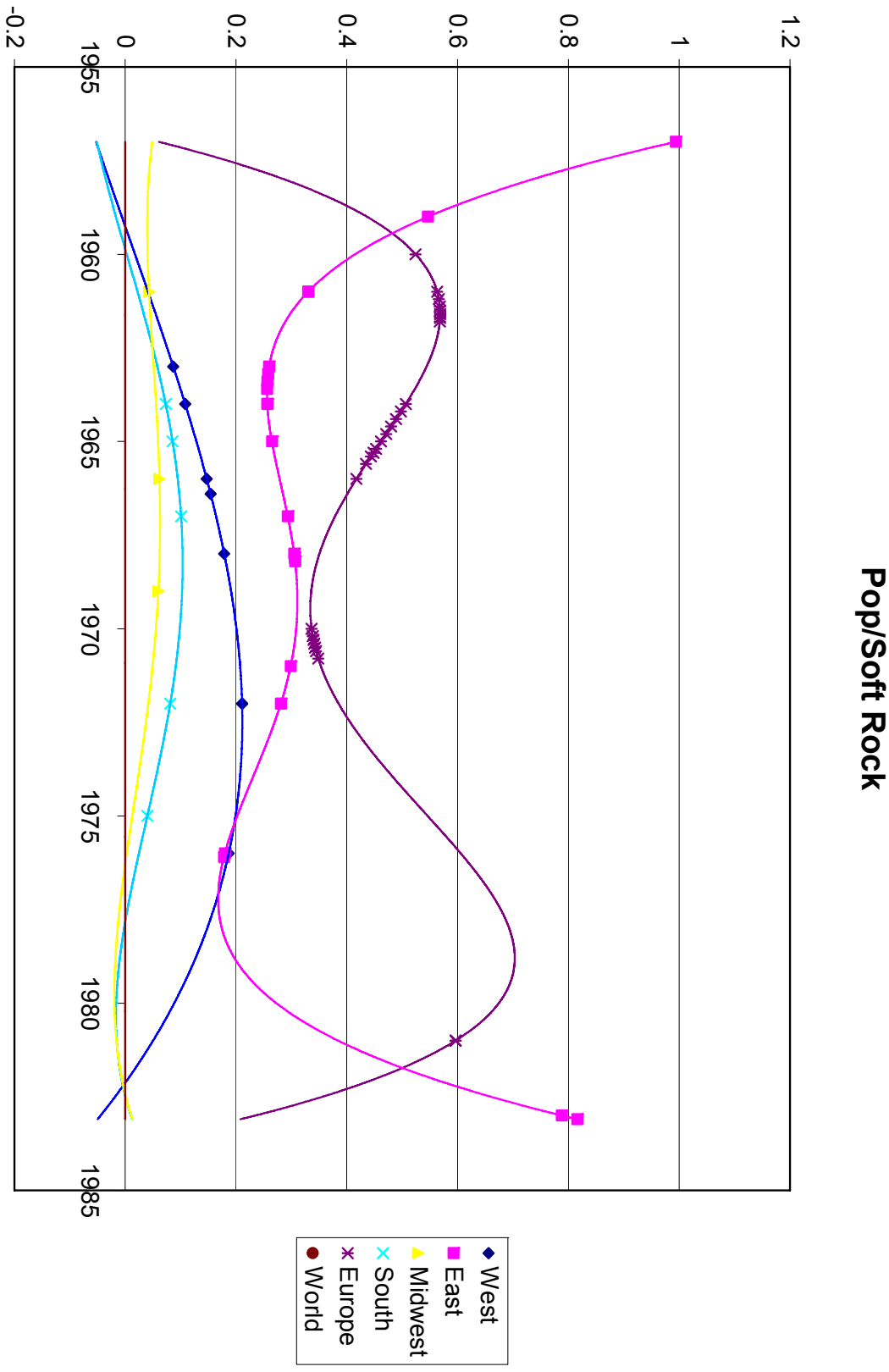

Figure 2f: Distribution of Regions for R&B over Time

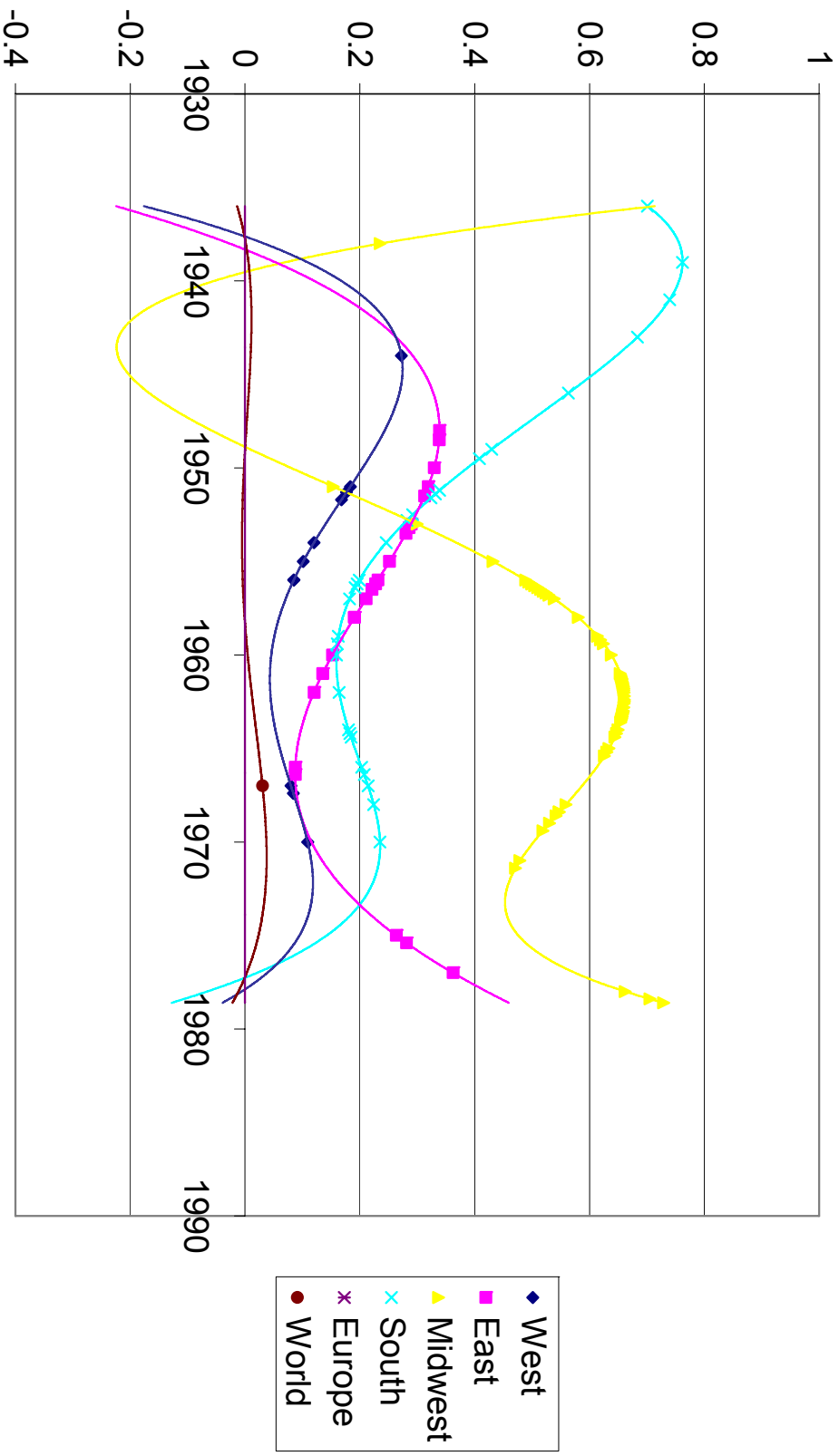

Table 1: Test for Independence – Genre vs. The All Genre Distribution

Genre	$\chi 2$ Statistic
Hard Rock	56.41142
Blues	40.61682
Pop Rock	45.28374
Alt Rock	29.02673
Folk Rock	45.71343
R&B	77.93981

Note: The Critical Value for $\chi 2$ with 5 degrees of freedom at 99% is 15.09

Table 2: Test for Equality Between the Distribution of Two Genres

χ^2 Statistics for Equality Between Two Distributions

	R&B	Folk Rock	Alt Rock	Pop Rock	Blues
Hard Rock	117.8308	47.21811	15.4182	20.93469	74.41832
Blues	10.05664	36.9572	53.78057	68.95641	
Pop Rock	93.72088	53.98053	3.279776		
Alt Rock	79.79993	51.97962			
Folk Rock	56.72454				

Note: The Critical Value for $\chi 2$ with 5 degrees of freedom at 90% is 9.236, at 95% is11.07 and at 99% is 15.099

Table 3: Peaks

Genre	Populous Primary	Primary (non-populous)	Secondary
Alternative Rock	Europe: 1965-1984	West: 1984-1993	East: 1966-1979
			South: 1985-1987
Blues	South: 1923-1944		West:1940-1952
	Midwest: 1944-1963		
Folk Rock	South: 1955-1959		East: 1960-1968
	West: 1960-1072		
Hard Rock	Europe:1963-1969	West: 1978-1993	East: 1972-1978
			World: 1973-1981
Pop/Soft Rock	Europe: 1960-1983		East: 1957-1975
			West: 1970-1975
R&B	South: 1936-1952		West: 1940-1950
	Midwest: 1953-1978		East:1942-1958

Table 4 . Test for Equality Between the Major Music Centers (Los Angeles, London, New York City and Nashville) and Others

Observed	First	Second	Third
LA+LONDON+NASHVILLE+NYC	55	48	47
OTHER	93	99	106
Expected			
LA+LONDON+NASHVILLE+NYC	49.5535714	49.21875	51.22768
OTHER	98.4464286	97.78125	101.7723
χ2 Statistic	1.46982134		

Note: The Critical Value for χ2 with 2 degrees of freedom at 90% is 4.605, 60% is 1.833

Table 5: Test for Equality Between the Major Music Centers (Los Angeles, London, and New York City) and Others

Observed	First	Second	Third
LA+LONDON+NYC	53	48	47
OTHER	95	99	106
Expected			
LA+LONDON+NYC	48.8928571	48.5625	50.54464
OTHER	99.1071429	98.4375	102.4554
χ2 Statistic	0.89616357		

Note: The Critical Value for χ2 with 2 degrees of freedom at 90% is 4.605, 40% is 1.022